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September 18, 2003
T38568US HS/Wg/aj

Claims

1. Method for the manufacture of a high temperature superconducting layer on a
5 substrate (1a, 1b) comprising the following steps:
 - a. deposition of an $\text{RBa}_2\text{Cu}_3\text{O}_7$ -layer (2) onto the substrate (1a, 1b) with a
low growth rate, wherein R represents yttrium, an element of the group of
rare-earth elements (atomic number 57-71) or mixtures of two or more of
10 these elements;
 - b. deposition of an $\text{XBa}_2\text{Cu}_3\text{O}_7$ -layer (3) onto the $\text{RBa}_2\text{Cu}_3\text{O}_7$ -layer (2) with a
high growth rate, wherein X represents yttrium, an element of the group of
rare-earth elements (atomic number 57-71) or mixtures of two or more of
15 these elements.
2. Method according to claim 1, wherein the low growth rate is $< 1\text{ nm/s}$ and
wherein the high growth rate is $> 1\text{ nm/s}$, preferably $> 2\text{ nm/s}$.
- 20 3. Method according to claim 1 or 2, wherein the $\text{RBa}_2\text{Cu}_3\text{O}_7$ -layer (2) comprises
a thickness of $< 500\text{ nm}$, preferably $< 100\text{ nm}$.
4. Method according to one of the claims 1-3, wherein the $\text{RBa}_2\text{Cu}_3\text{O}_7$ -layer (2)
has a thickness of $> 5\text{ nm}$.
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5. Method according to one of the claims 1 – 4, wherein the $\text{XBa}_2\text{Cu}_3\text{O}_7$ -layer
(3) has a thickness of $> 1\mu\text{m}$.

6. Method according to one of the claims 1 – 5, wherein the $\text{RBa}_2\text{Cu}_3\text{O}_7$ -layer (2) is deposited onto an at least biaxially textured substrate (1a) or a substrate with an at least biaxially textured buffer layer (1b).
- 5 7. Method according to one of the claims 1 – 6, wherein the $\text{XBa}_2\text{Cu}_3\text{O}_7$ -layer (3) is deposited as a precursor layer, comprising the metal components of the high temperature superconducting layer.
8. Method according to claim 7, wherein the precursor layer is transformed in a
10 further method step by a temperature treatment with a high transformation rate into a superconducting $\text{XBa}_2\text{Cu}_3\text{O}_7$ -layer (3).
9. Method according to claim 8, wherein the transformation rate is $> 2 \text{ nm/s}$.
- 15 10. Method according to one of the claims 1 – 9, wherein R represents a rare-earth element with a great ion radius (La, Pr, Nd, Sm, Eu, Gd) or compounds comprising to at least 50% these elements in mixtures with other rare-earth elements
- 20 11. Layer system of a high temperature superconductor manufactured according to a method of any of the claims 1 – 10.